

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

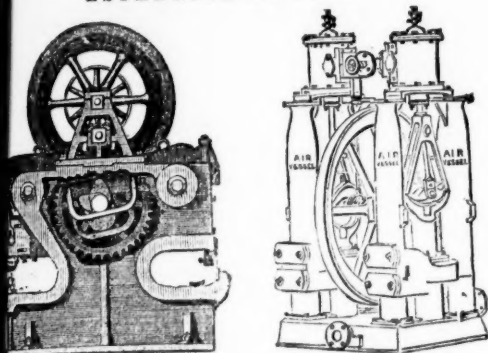
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2138.—VOL. XLVII

LONDON, SATURDAY, AUGUST 12, 1876.

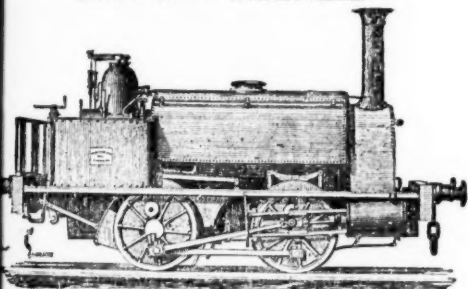
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exhibited the McKean Drill alone as the MODEL BORING MACHINE
for the ST. GOTHARD TUNNEL.

SILVER MEDAL of the Highland and West of Scotland
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At the south end of the St. Gothard Tunnel, where

THE MCKEAN ROCK DRILLS

Are exclusively used, the advance made during eight consecu-
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28'30, 27'10, 28'40, 28'70 metres. Total advance of south head-
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In a series of comparative trials made at the St. Gothard Tun-
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number of machines employed, and with important saving in
cost. The ratio of advantage over hand labour is greatest
where the rock is hardest.

These Machines possess many advantages, which give them
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PER MINUTE—do not require a mechanic to work them—are
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the longest feed without change of tool—work with long or
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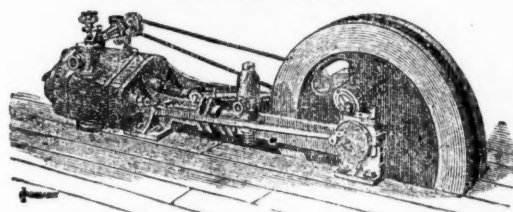
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- 4.—THEY ARE THE ONLY MACHINES THAT MAKE THE ORE CLEAN
FOR MARKET AT ONE OPERATION.

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and abroad—viz.,

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Duke of Buccleuch's); Bewick Partners, Haydon Bridge; the Old Darven, Esclair-
mwyn, and Ystumtuen Mines, in Cardiganshire; Mr. Beaumont's W.B. Mines,
Darlington; also Mr. Sewell, for Argentiferous Copper Mines, Peru; the Brats
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America, and Australia, from all of whom certificates of the complete efficiency of
the system can be had.

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profit on our Nanthead waste heaps amounted last year to £600, besides the ma-
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course, if it had been wholly engaged in dressing wastes our returns would have
been greater; but it is giving us every satisfaction, and bringing the waste heaps
into profitable use, which would otherwise remain dormant."

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been at work at these mines for fully a month, and each day as the moving parts
become smoother, and those in charge understand the working of the machinery
better, it gives increasing satisfaction, the ore being dressed more quickly, cheaply,
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wages we have now to pay. Over and above the saving in cost is the saving in ore,
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GREENSIDE MINE COMPANY, Patterdale, near Penrith, say—"The
separation which they make is complete."

Mr. MONTAGU BEALE says—"It will separate ore, however close
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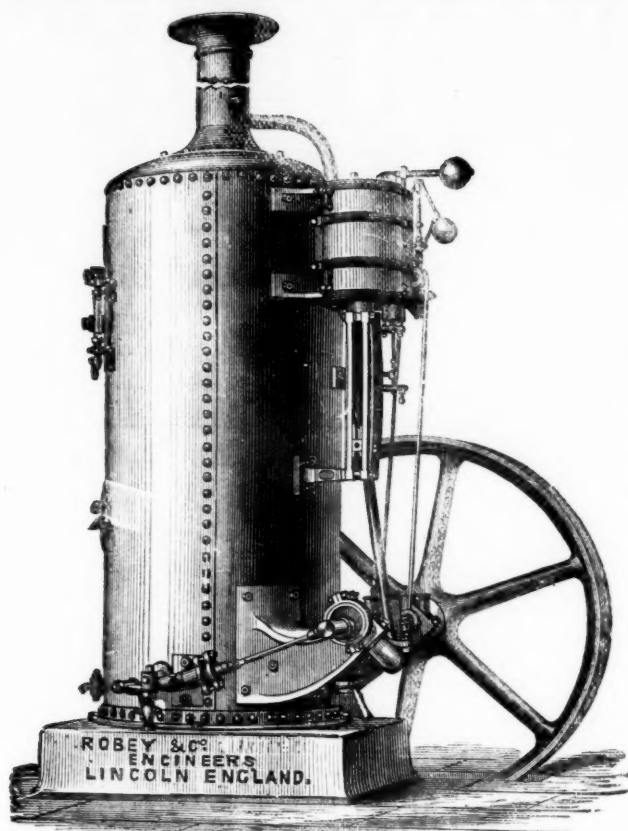
Mr. C. DODSWORTH says—"It is the very best for the purpose
and will do for any kind of metallic ores—the very thing so long needed for dress-
ing floors."

Drawings, specifications, and estimates will be forwarded on application to—
GEORGE GREEN, M.E., ABERYSTWTH, SOUTH WALES

Patent No. 4136 : : : :
Patent No. 4150 : : : :

Dated 16th December, 1873.
Dated 17th December, 1873.

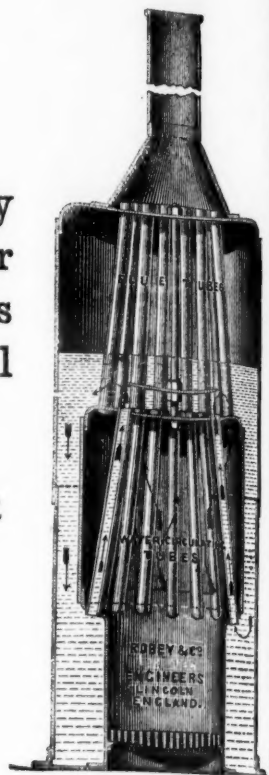
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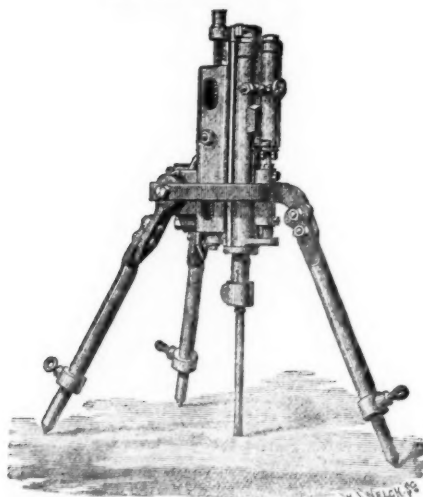


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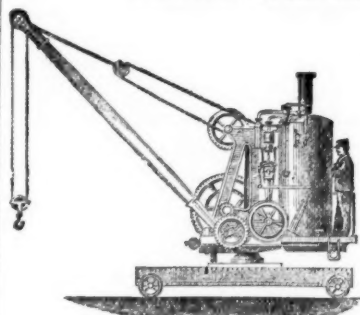
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PERSHOUSE PARKES, Castle-street, Tipton.
T. SMITHDALE AND SONS, St. Anne's Ironworks, Norwich.
R. PATTERSON AND SONS, Belfast.

Original Correspondence.

MINING IN COLORADO—SOUTH PARK—No. II.

SIR,—In consecutive order, we now take the cretaceous system. The stratified beds are conformable with those of the eocene last described, but as they advance toward the mountains are somewhat steeper in their inclination. There does not appear to have been any great disturbing influence ever at work along the hills covered by this formation except that common to subsidence, which merely by this formation slides. As far as can be seen externally this results in "bed plane slides," not exceeding 1000 ft. The same thing occurs on the eastern side of this range of mountains in Boulder and Jefferson counties; but there heavy displacements have occurred, tilting the strata up to a vertical position, and, in some instances, reversing their normal bed planes. Their lithology is simple, consisting merely of argillaceous limes, grey sandstone, calcareous shales, thin seams of gault, white grits, aluminous or sulphate or alumina, with a few beds of soft bituminous earths. I have found petroleum springs in several places on the east side of the range, and very strong soda springs—near which are deposits of rich carbonate of iron, as well as hydrates of the very finest quality. At present I have not yet met with any of these minerals on this side; but I have no doubt they exist here, as the geological conditions are identical. Some of the lime beds are available for the manufacture of hydraulic cements. All the fossils yet found are the testacea, consisting of ostra, gryphae, cyprina, rhynchonella, pecten, terebratula, and thracia—univalves are quite rare; but the most abundant of all the mollusca is the mytilus, or common mussel, which are of large size. I have found some 6 in. in length, showing they lived in fresh or brackish water. Where I find these they are in a quarry, the stone of which is burned, and produces a beautiful white quicklime. These does not appear to be any flora fossil other than some comminuted particles of carbonaceous matter in the dark-blue and brown shales. Next follows the trias, consisting chiefly of fine-grained red sandstones, intercalated with conglomerates and grey and deep red clay stones: there are some limes and marls. It is of great thickness. In one escarpment of the mountains, where it can be very distinctly examined, I estimated it to be nearly 4000 ft. in thickness. It is the new red sandstone of the Rocky Mountains, and extends unbroken for hundreds of miles. I never found any minerals of value in it other than iron, which is chiefly hematite. I am of opinion it is in the lower beds of this formation where the salt deposits lie, for I have never found any saline springs in the systems below it, although sulphur and soda springs are numerous. It contains beds of beautiful freestone, which for building purposes cannot be surpassed, also a nearly white fine grit dolomite, called sometimes Colorado marble. There are also beds of red-banded silicious lime, which is admissible of a high polish, and is very handsome. It would make a superb mosaic pavement for corridor and hall floors. There is a great paucity of organic remains in all these rocks—all are highly ferruginous. The oolite stratum is thin; its grains are very fine, and not readily distinguishable, only by aid of a magnifying glass. It lies down low in the system, and upon beds of lias. Some specimens exhibited at the Denver fair were of very fine texture, and prepared for the use of the lithographer. I do not know if stone of this quality is abundant or not; if it is quarries will become valuable. By insensible gradations the formation passes into the Devonian, which is also of great thickness. There are no carboniferous rocks proper: this system is entirely missing. The Devonian is not uniform: it appears to be in irregular swells on the outlying spurs of the main range, one which I know of is 4 miles in width at the surface. Occasionally we find it in parallel ridges. This formation may be called the commencement of the rich metal-bearing rocks. Its structure is partially stratiform, although, as viewed from a distance, the large masses on great elevations appear to be amorphous. The cleavage planes have all a north-east tendency. It consists of quartzites in almost every known variety—from the coarsest crystalline to the finest grits—and of every shade and colour. Those that are most siliceous are the uppermost. Then follows a dirty brown, closely laminated gneiss, in which are lumps and veins of opaque or milky quartz. Between these two latter classes of rocks, and partially in both, are lodes of copper. The ore is chiefly a carbonate, and exceedingly rich. I have some specimens that assay 65 per cent. of copper and 40 ozs. of silver. The main lodes are generally outcropped with a strong gossan, which runs from 1/2 oz. to 3 ozs. of gold. The gangue is chiefly granular quartz, alumina, and some calcareous flookan, heavily impregnated with sulphuret of iron. Layers of reddish brown concretionary granites appear: they have intervening beds of schistose rock. Although these are foliiform in structure they are not slates.

There are no clay-slates in these mountains; at least I have never found any yet in my five years' explorations. The granites are very friable: they are much decomposed at surface by the atmosphere, causing the hill tops to be rounded off in mound-like shapes, and the slopes presenting fair even inclines. These are covered with a fine stunted grass, producing rich herbage, on which the elk deer and mountain sheep principally exist. In this rock are veins of gold, or rather veins of ferruginous matter carrying gold. It is by their natural decomposition the placer mines or diggings in the valleys below are supplied with their precious metals. This gold, however, does not all emanate from the lodes and veins, although they are in all probability the largest contributors, for we find where they cross the valleys in their immediate vicinity are the most prolific gravel beds. All the rock is more or less diffused with gold in chemical combination: it lies in the pyrites. The disintegration constantly going on by climatic changes decomposes them, and thus sets the gold free. This subsequently finds its way down into the gulches, where, if allowed time to rest by molecular action, it takes the form of grains, and becomes the gold dust of the miner. These secondary granites contain but little mica, and what there is of it is in finely comminuted scales; but in some of the quartzose variety, where they are very coarse, plates of mica are frequently found quite large, I have some 7 in. long by 5 in. wide, and so extremely attenuated in their laminae that they can be readily split out 1000 to the inch; generally, however, this valuable substance does not exceed more than from 2 in. to 4 in. in length. Below this comes a series of sandstones, so called: they consist of an agglutination of angular particles of the older rocks. They have evidently never been subjected to attrition, or only to a very slight degree; the cementing medium is siliceous. They are really quartzites, and not sandstones proper. The remainder of this group are considerably mixed, and for which I have no name; but in them are veins carrying gold, copper, silver, lead, bismuth, nickel, and manganese. Some of the copper specimens that are iridescent when in a cluster of pellucid rock crystals are very beautiful. Nearly all these ores are rich in their respective metals, and very abundant. Magnetite, a black oxide of iron, is freely interspersed through nearly all these rocks; and from my observations I find where this mineral is strongly prominent, and felspar enters largely into the composition of the rock, the veins passing through them are usually rich in the precious metals. It is somewhat difficult to ascertain the exact thickness of this Devonian formation; it can only be approximated. By a close examination of the detritus along the mountain side a localis of the divisional line may be founded; but this is somewhat indefinite unless the search is made at right angles with the selvages of the several strata, which can be done only where they run in courses parallel with the valleys. The debris in the bottoms is mixed with erratic stones and boulders that have come away from places far up in the mountain range. Some of them have been transported by fluvial others by glacial action. In the latter case it is evident in the moraines, which are common in the upper parts of the gorges, where are abrupt and rise steeply; it is, therefore, only by taking averages of the stones in what is here called the "float" that we can approximate a line of demarcation.

THE SILURIAN, UPPER AND LOWER.—This system is distinguishable from the more advanced metamorphic and crystalline condition of its rocks, and not from any organic vestiges to sanction its being called by this name, for they are apparently azoic. We might name it the pre-meridian or scalent, after Prof. Rogers; but such would not be generally understood, although an admirable arrange-

ment of classification. I have, therefore, adopted the usual European nomenclature, as adduced from the common knowledge of consecutive systems. The upper series consist of blue, grey, green, and purple gneiss, concretionary granites, quartzites, and embedded quartz veins: they are all copper and silver bearing. The lodes are strong, and many carry a gossan on the backs, which is rich in gold; but they are all silver lodes in depth—they contain very little felspar. These are visible at the head waters of the River Platte, and are very distinct from the rocks of the Devonian, just described. The lower series, which form the central part of the snowy range, is of anterior age: its rocks are chiefly gneissic, but more indurated, of closer texture, and crystalline, yet differing little in their specific gravities. They are traversed with veins and dykes of injected granite, porphyry, trachyte, greenstone, basaltic trap, and epidote. There are abnormal masses of syenite, diorite, and hornblende gneiss, with beds of vitreous whinstone. Where uniform the bed-planes of the stratum dip at an angle of 75°. The cleavages are north-east, with right-angled heading joints: all are silver bearing. They constitute the entire lower rocks of the range. Whether they repose on the Cambrian or other older formations I have not as yet ascertained. They certainly contain no primitive granites other than those of a purely igneous character; therefore, we may suppose there is yet an intervening system. The surface exposures from whence I have made the foregoing examinations is 14,250 ft. above sea-level.

My next will conclude the geology of this end of the Park, with a description of the limestone deposits of Mont Bross and the celebrated Moose Mine, which has given such notoriety to this district.

CHARLES S. RICHARDSON, G.M.E.

Alma Smelting Works, Park County, Colorado, June 1.

THE LOWER URAL COUNTRY, AND RAILWAYS.

SIR,—We are in the very heat of the early railway days here, and unless the Turkish Question leads to war, or uncommonly adverse financial difficulties otherwise supervene, of which, notwithstanding the rather uncomfortable signs lately on the Exchange, people in Russia do not seem to be greatly apprehensive, we shall see the steam-horse coursing in all directions over these monotonous expanses of prairie, and along the green slope of the Urals, and the curse of distance will be mitigated. It is regarded as almost certain that this summer already the Samara-Orenburg Railway will be opened, and almost simultaneously with the opening of that road operations will commence for the prolongation of the same line to the great salt mines of Ilek—70 versts beyond the Ural river and Orenburg in the Kirghis steppes. The engineers of the company constructing this line have made a preliminary survey of a line also from Orenburg to the Bielaia river, by which, with about 150 versts of road, Orenburg and the steppe country beyond will be placed in communication with the great water-system of the Volga, and what is not less important, with the wood supplies from the forest land on the Bielaia basin. But probably this branch derives still more importance from the fact that it is looked upon as the first instalment of a line along the western slope of the Ural to Perm, where it would join the great Siberian line. As far as the Bielaia the nature of the ground is easy. It is true there is a long lateral chain of hills to be traversed some 40 miles before reaching the Bielaia, but with a curve or two, which the ground renders easy, this offers no difficulty, nor, indeed, will it entail any very considerable increase of expense. From the Bielaia onwards to Perm, however, the engineer has quite another description of surface to deal with. He has hills and endless mountain gorges to pass over; still, even here nothing occurs worthy being called engineering difficulty. It is country not more difficult than Devonshire, or the less hilly parts of Wales or Cornwall.

The event which commands most attention in railway matters in this part of the empire, however, is the great line to Southern Siberia and Central Asia. After long debate the Central Government seems to have declared definitely in favour of the line by Viatka, Perm, Ekaterinburg, and Troitsk, as opposed to the rival project of a line via Orenburg. What will form a portion of this line between Perm and Ekaterinburg is (already two years since) in construction, and the latest intelligence seems to point to a commencement this summer throughout its entire extent. Orenburg, as has been proved again and again of late years, vindicates her right of pre-eminence to the title of "Porte de l'Asie." This city is unquestionably the best basis of operations in Central Asia, as much in a military as an administrative and commercial sense. It is from here that the dispatch of troops and supply of military material have been found both in summer and winter to be attended with the least difficulty. Orenburg resembles in rapidity of growth more, it may be, than any other town in the Czar's dominions the cities of the great Republic of the West. The question which now most nearly affects Orenburg, and the Central Government with respect to Orenburg, is how that city is to be placed in connection with the great trunk line to Central Asia. It was in connection with this question that during the present winter Gen. Bezonskoff, the chief of the commission for these railways, visited Orenburg, and reconnoitred the ground for a line across the extreme southern point of the Urals, from Orenburg towards Troitsk. It is said that the General has concluded favourably with respect to the line.

Recapitulating, here then is the position of the railways in this part to date:—The Volga-Orenburg line will be opened to traffic this year; contractors at work (two years since) between Perm and Ekaterinburg, making the first portion of the great line to Central Asia; operations about to be commenced from Orenburg to Ilek; and the Ministry of Public Works and contractors busy with new projects for the lines Perm-Orenburg and Orenburg-Troitsk. It is not necessary to seek the cause of all this railway activity in political motives, although so far as Central Asia is concerned such motives are unquestionably the prime movers. The natural resources of this sub-Asian country in soil and minerals are so great that, supposing the territory were in Canada, or the United States, or, perhaps, even in India, no political considerations would be needed as inducements to bring it into communication with the general railway system. Lines would long ago have been made across and along this rich country, and every acre of land would have been bought up at prices tenfold that at which it now changes hands. By-the-by, perhaps nowhere does there offer a better employment for capital than the purchase of land along these new lines of railway, and on the western slope of the Urals. Who can doubt that what has taken place on the other side of the Volga as the result of the opening of railways will, within the next few years, repeat itself in the country through which these lines are traced? The land is not worse but decidedly better than on the European side of the Volga, and to my certain knowledge the price of land there rose immediately six times in value, and here it will also rise from the 3 roubles to 4 roubles, its present value, to perhaps ten times that value. Evidence is not wanting that Russian capitalists are sufficiently aware of this coming change. They are beginning to buy up land, in many cases the buyer coming from the old Governments of the Empire. In fact, considering the little capital in the country in proportion to the greatness of the demands upon it, this land purchase goes on with considerable activity. It is significant when one finds that the Orenburg and Ufa merchants, who only a little while ago exhibited the greatest indifference about land, are now buying everywhere to the full extent of their means. In fact, so great is this mania for land buying that it is the theme in every posthouse and on every steamboat, and one can hardly be respectable among them without having the title to an estate in his pocket!

The impending changes will hardly bring more good to anyone than to the Russia Copper Company. This association of English capitalists some years ago purchased, besides the two finest landed and mineral estates in the lower Ural country, mineral rights over an extent of territory equal to a couple of the largest German duchies. Their freehold possessions cover nearly half-a-million of English acres of land. Both the lines Perm-Orenburg and the Orenburg-Troitsk will pass close by, if not through, the vast landed estates of this company, and the line about to be opened from Samara to Orenburg passes within 14 miles of one of their minor estates and their principal mines.

Perhaps hardly a better illustration could be given of the benefit

resulting from these railways than in connection with such possessions as those of the Russia Copper Company. It will tell in its beneficial results—first, by bringing about the means of taking the products to market, for whereas the copper, corn, and other products have to be allowed to accumulate during the greater part of the year, they will by-and-by be realisable at the great markets as they are produced, and the capital, which before necessarily went into stocks, will by so much be set free for current purposes. What takes place as to transport, although perhaps it will be quicker felt than any other effect, is, nevertheless, not more important than the increase of labour from immigration, for it is well known that it is on the score of insufficient labour more than any other that the Russia Copper Company, in common with all other enterprises in this part of Russia, has been straitened and encountered drawbacks. Immigration has long since set in, but, compared with the requirements of the country, it is slow. What is wanted is the acceleration of it, which will naturally be the effect of better travelling communication and the enhanced value of the products of the soil.

What I mean by enhanced value of products of the soil will be better explained when I say that, whereas there has been the cry of famine in the more southern governments of Poldolia and Veronej, and that while here hundreds of thousands—nay, millions—of acres of hay perish annually in the fields (no one to save it), nearly all the cattle in the southern provinces have either perished or been sold off at a third of their value for want of straw or hay to winter them; rye this winter has been selling in this part of the country at 1s. a bushel (25 kopeks a pood), and wheat at 1s. 10d. a bushel (40 kopeks a pood).

It is devoutly to be wished that with the railways there will be the advent of remedy in some way or other of the huge evils of bad police and local administration, for certain it is that without such improvements neither the railway nor anything else that will come with it can result in anything but disappointment. The evils of which I complain may be seen in any public paper, and are the everlasting theme of complaint of all intelligent men, and of all Government officials as well in the highest as the lowest grades of office. The abuses of the district police in particular are the incubus of the country, and eat at the vitals of everything like confidence where business of any magnitude beyond that of a pedlar is concerned. Putting aside all minor grounds of complaint, what hope can there be of order or justice when a chief of the district police is allowed to treat with recklessness and contempt both law and higher administration; and when workmen of whole communes are allowed to disregard with impunity the obligations of contracts of unquestionable clearness and legality, and upon the signature of which they have received large sums of advances, sometimes to the extent of one-third or one-half of the value of the work contracted for, by which to pay the Government taxes? There is, perhaps, no country whose laws keep a more jealous watch against all disturbances among workmen, such as strikes, &c., and yet there are cases of the most aggravated kind where the police of the district, whose duty it is to maintain order, have acted in reckless disregard of such laws from mere wanton abuse of authority, or from prejudice, or some not more worthy motive.

Every friend of progress in Russia will rejoice if pessimists—as it seems they will be—are to be disappointed in their predictions of what they call the inevitable financial crash in railways, after the examples of things in the West. Did not this mistake in their estimates of Russian railways arise from not allowing sufficient play to the exceptional effect on the capital of the country produced by railway communication? And such a mistake was, perhaps, natural enough to people who left out of sight the difference there is in the use of railways in countries where the products of the manufacture are taken warm from the workmen's hands, when compared with Russia, where for the most part money absorbed in one year's manufacture was, before the time of the railways, not returned until the outlay for a second year's production had been incurred. It is not too much to say of railways in Russia that not only do they, after the American fashion, make the country by bringing totally new conditions of commercial activity to the distant provinces, but they double or triple the productive power of existing capital, and in no part of Russia does this apply more than to the province of Orenburg. The gratitude of the country is due to the Governor-General of Orenburg for the energy and sagacity with which, notwithstanding great discouragement, he has persevered in recommending and pushing the scheme for these great works.

It may not be out of place to add, in connection with railways in this part of Russia, that those who are experienced with the great water system of the Volga aver that there is almost year by year a sensible decrease of depth of water, as the result of the destruction of the forests in the country by which it is fed. So decided is this decrease in the last few years that it is predicted that the time is not far distant when Nijni fair must be removed to some place further down the stream.

GEORGE RICKARD.

Orenburg, June 29.

IRONMAKING IN SOUTH WALES.

SIR,—The iron trade of South Wales is at present depressed and unsatisfactory; indeed, seeing the insolvent state of some of the joint-stock establishments making iron one might almost fear that ironmaking in South Wales will soon become a thing of the past. This has created lamentable disturbing causes, tending to widen the breach between labour and capital. It is evident from the published statements of returns on capital invested in this branch of trade that many of the ironmaking firms have long been in a critical condition, so that the slightest agitation either in the labour or commercial market led to suspension. We have been repeatedly told that these disturbing causes were fast sending our own trade to foreign lands, and that unless the working class submitted to the employers' terms the latter could not compete with foreign nations. This is no doubt true, but there have been other disturbing causes even more destructive than any combination of labour—the production of rotten and unmarketable pig-iron. Cheapness is no doubt desirable, but it is useless to consider cheapness alone, and to neglect quality. Notwithstanding the apparent cheapness with which iron has been produced by the hot-blast from coarse and unsuitable raw material, much harm has been done by the local wisdom introduced into ironmaking, bewildering and confusing us operatives until nearly all the old modes of treating pig iron have disappeared, the worst feature of all being that the conditions sought to be substituted for those formerly recognised being ill chosen and unreliable, and it would be a matter for congratulation if some practical method of alloying should be discovered which would compensate for the irregularities of the pig-iron, and permit of a reliable article being obtained suitable for special sections of metal of good marketable quality. But the fact seems to be that much of this worthless produce are of such a character that chemistry alone could determine its constituent parts, and suggest its further treatment. It is this material that has been used by both master and man for the practice of a vast amount of trickery, such as the complaints of extra waste, large amount of physical toll that is necessary to make it of commercial value, and that a truly astonishing amount of labour and difficulty is necessary to make the metal malleable, so that contempt and utter recklessness in the dealing with this product, and a larger chasm is being daily placed between labour and capital.

The slippery manner of treating this iron has given it a fallacious value. No doubt as much as from 30 to 35 per cent. is really and truly lost in puddling, though by some mysterious method of keeping the accounts the figures are made to show a loss of 8 or 10 per cent. only. Representing these items as the truthful product of the several operations, those interested are led to the supposition that returns on capital might or could be ensured on those conditions. The result of all this is still more apparent when these uncertain alloys are converted into the required marketable section, and more especially when there are such undefined angles composing such sections as are frequently met with. In the formation of various sections of rails which it is necessary to make perfect and reliable there is frequently, in consequence of the fibrous and homogeneous character of much of the whole matter, as much as 10 or 15 per cent. to be cut up as neither according to section or otherwise marketable. Taking 10 per cent. as the basis of calculation, we may form some idea of what these cut-ups mean on the part of both master and man in twelve calendar months, and those connected with the mill or heating departments will bear me out in the truth of what I state. Taking the product of four furnaces at 16 tons in 12 hours, or, as they work alternate shifts, 16 tons in the 24 hours, or 176 tons for the 11 shifts in the week, there will be 912 tons turned out in the 52 weeks, or 915 tons loss, yet at many places I could mention this rate of loss has been going on for years. Taking the most unprejudiced view of the whole matter, it is obvious that these figures call loudly for investigation and practical reform, and I am sure that all acquainted with the subject will acknowledge that I have not exaggerated. My aim is that if the iron trade of South Wales should ever be restored to its former prosperity, those who provide the capital should, ere they part with their money, make strict enquiries as to the persons into whose hands they are going to entrust it. We working classes have frequently had to mourn the loss from South Wales of many good and humane employers, no doubt from want of returns on their subscribed capital. Now, if these gentlemen had depended less on the book wisdom of those who held high and responsible appointments under them, and copied more closely the aims and actions of our Crawshays, Hills, Guestes, &c., their concerns would have been much better regulated, and satisfactory returns would have been made.

It is, probably, now pretty widely acknowledged that if those who had control of the money and materials of some of those defunct companies had possessed

It now becomes a question what the ton of stuff is worth,

As regards the efficiency of the skill and labour applied, one of the ablest mine inspectors in Cornwall says—"Reynolds's engine-shaft is sunk vertically to the depth of 84 fms. Below the deep adit level, and at this point a cross-cut is being driven to intersect Wheal Kitty and other lodes in that direction. At the 72 fm. level a fine materly lode has been cut, and opened on about 25 fms. The lode has varied in size from 2 to 3 ft. in width, and has been worth 20*l.* per fathom for tin and 2 tons of copper ore per fathom. The out-

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English, at 1*s*. 4*d*. to ground or crystal; foreign, 1*s*. 3*d*.; crystals, oxalic, 6*d*.
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ium salts, 4*l*.—Copper Salts: Sulphate of copper, 23*s*. 10*s*.—Magnesia: Oxide,
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Muriate, 4*s*. per cent.; at 5*s*. 6*d*. per cent.; carbonate, 1*l*. 10*s*.—Potash:
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carbonate, 10*l*. 15*s*.; salt cake, 2*s*. 15*s*.; Glauber salts, 2*l*. 17*s*. 6*d*.—Sugar of Lead,
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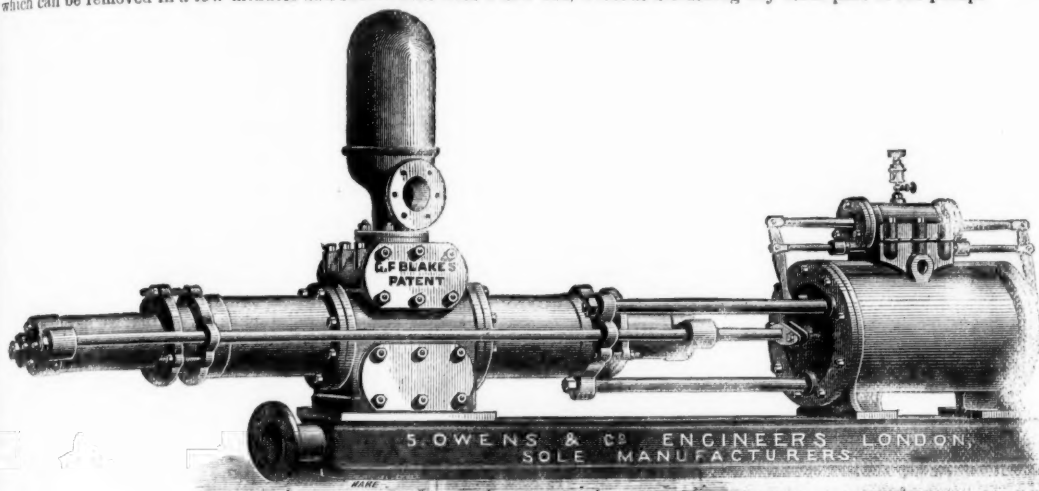
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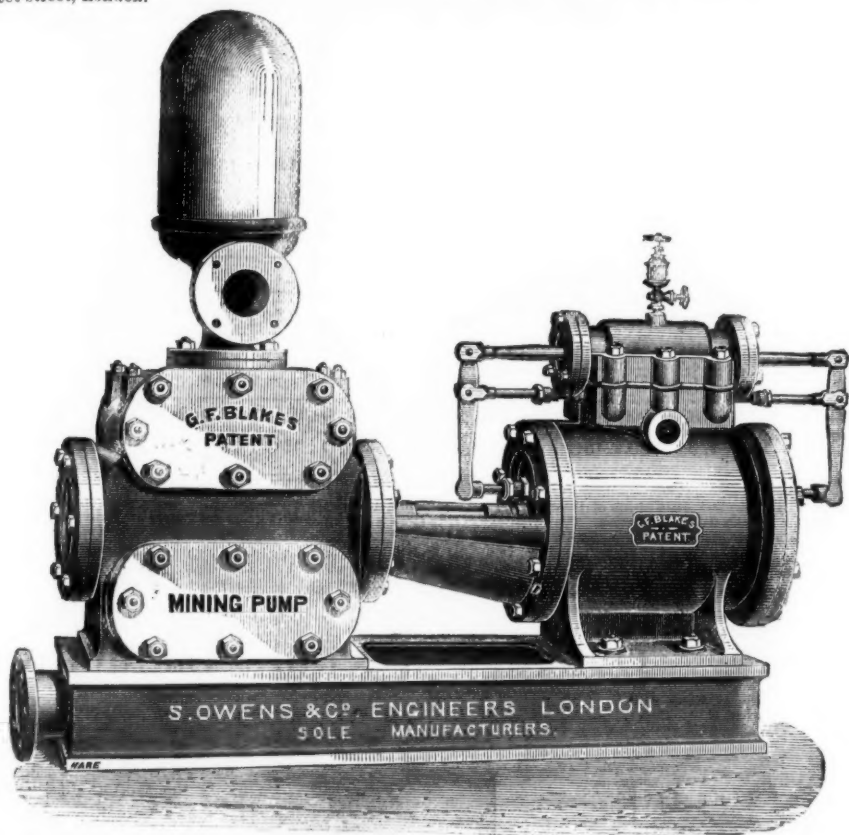
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Length of stroke, In.	18	18	18	24	24	24	24	24	24	24	24	24	30	30	30	30	30	36	36	36	42
No. of strokes per minute.	30	30	30	30	25	25	25	22	22	22	22	22	22	22	22	22	22	22	17	17	15
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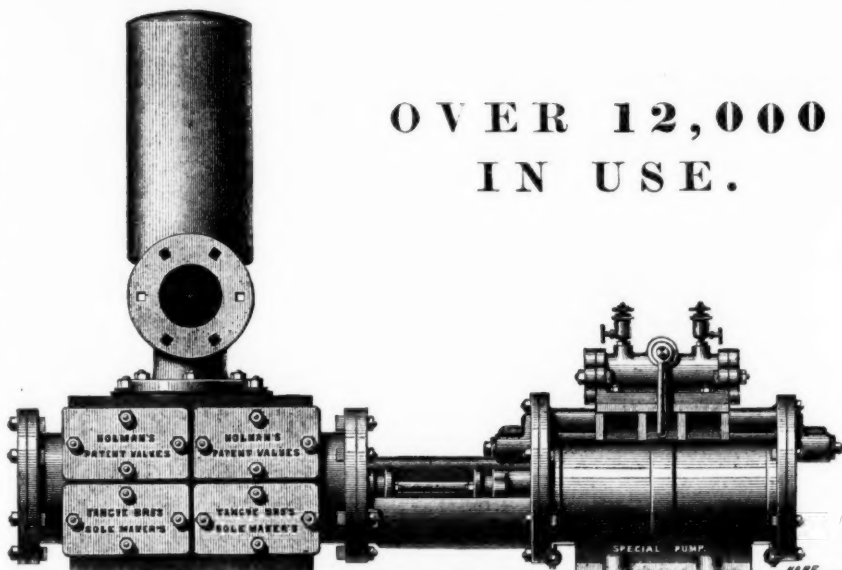


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Diameter of Steam Cylinder...In.	3	4	4	4	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9	10	10
Diameter of Water Cylinder...In.	1½	2	3	4	3	4	5	3	4	5	6	3	4	5	6	4	5	6	7	8	5	6	7	8	9
Length of Stroke.....In.	9	9	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	18	12	12	12	18	24
Gallons per hour	680	815	1830	3250	1830	3250	5070	1830	3250	5070	7330	1830	3250	5070	7330	9750	3250	5070	7330	9750	13,000	5070	7330	9750	13,000
Price	£ 18	18	20	25	22	10	32	10	25	30	35	40	30	35	40	45	50	40	45	50	55	65	50	55	60

CONTINUED.

Diameter of Steam Cylinder..In.	10	10	10	10	12	12	12	12	12	12	14	14	14	14	14	14	16	16	16	16	16	18	18	18	18
Diameter of Water Cylinder..In.	7	8	9	10	6	7	8	9	10	12	7	8	9	10	12	14	8	9	10	12	14	9	10	12	14
Length of StrokeIn.	12	18	24	24	18	18	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Gallons per hour	9750	13,000	16,519	20,000	7330	9750	13,000	16,519	20,000	30,000	9750	13,000	16,519	20,000	30,000	40,000	13,000	16,519	20,000	30,000	40,000	16,519	20,000	30,000	40,000
Price£	55	75	90	100	75	80	85	110	120	140	110	120	130	140	160	180	140	150	160	180	200	180	190	210	230

Intending purchasers of Steam Pumps would do well to observe the great length of stroke, short steam cylinder, and short piston of the “Special” Steam Pump, as compared with the short stroke, long steam cylinder, and long piston of the Pumps of other makers, as the efficiency and durability of the machine, and the space occupied by same, greatly depend upon this. The advantage of long strokes will be obvious when purchasers are reminded that each set of suction and delivery valves of a “Special” Steam Pump with 24 in. stroke, running at 120 ft. per minute, would open and close only 30 times per minute, as against 120 times per minute in a Pump with only 6 in. stroke performing same duty.

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Turns waste steam into
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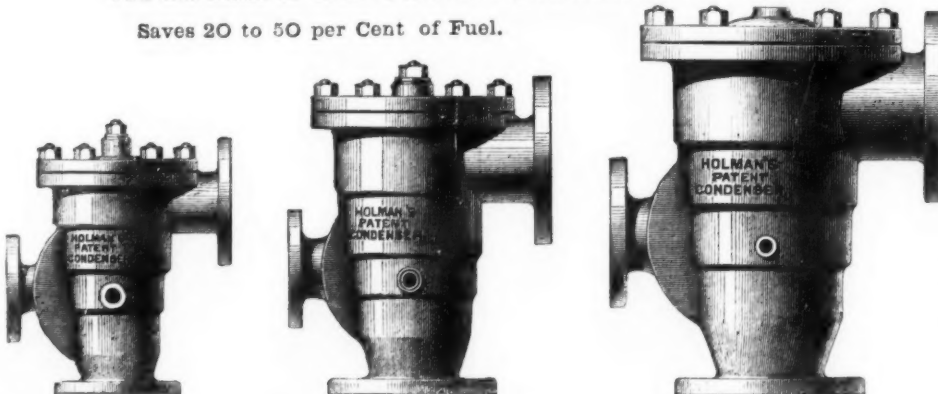
REQUIRES NO THREE-WAY COCKS,
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PREVENTS ALL ESCAPE OF STEAM IN
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REQUIRES NO EXTRA SPACE.

Saves 20 to 50 per Cent of Fuel.



These Condensers are made to suit any kind and kind of Steam Pump. They form a part of the suction pipe of the Pump, and when they effectually condense the exhaust steam they produce an average vacuum of 10 lbs. per square inch on the steam piston, increasing the duty of the Engine, and effecting a saving in fuel of from 20 to 50 per cent.

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All Boiler Feeders are recommended to be fitted with these Condensers, as not only the exhaust steam utilised in heating the boiler water, but is returned with it into the boiler.

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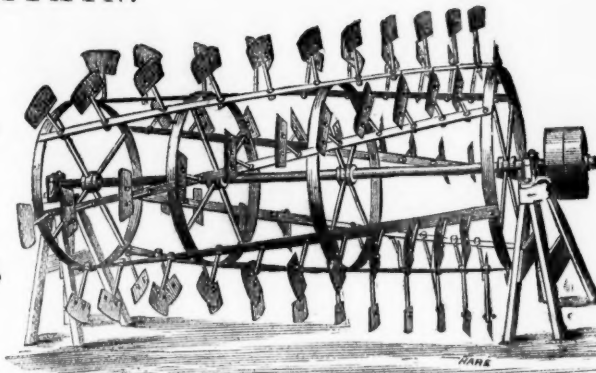
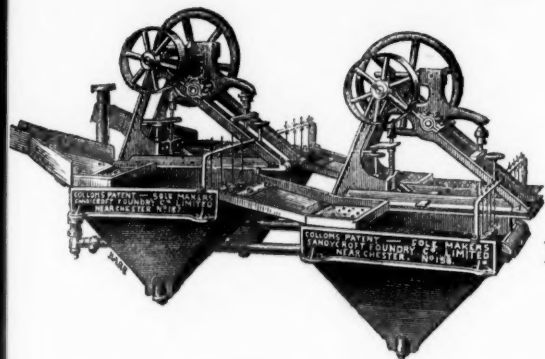
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ROLLS

OF PECULIARLY HARD AND TOUGH MIXTURE

&c., &c.



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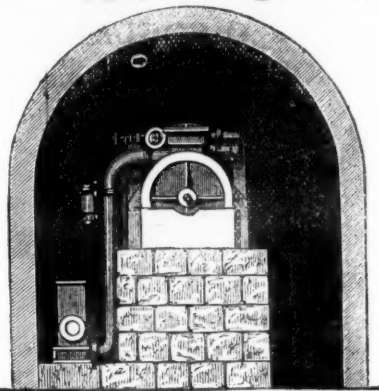
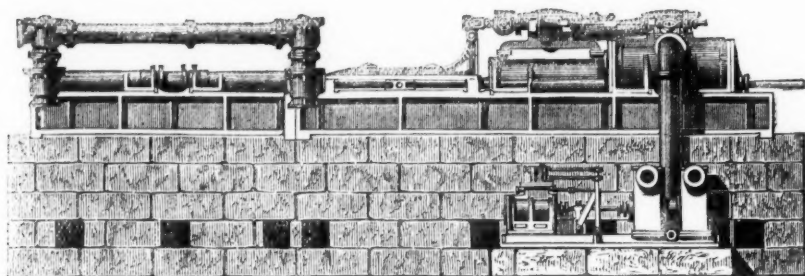
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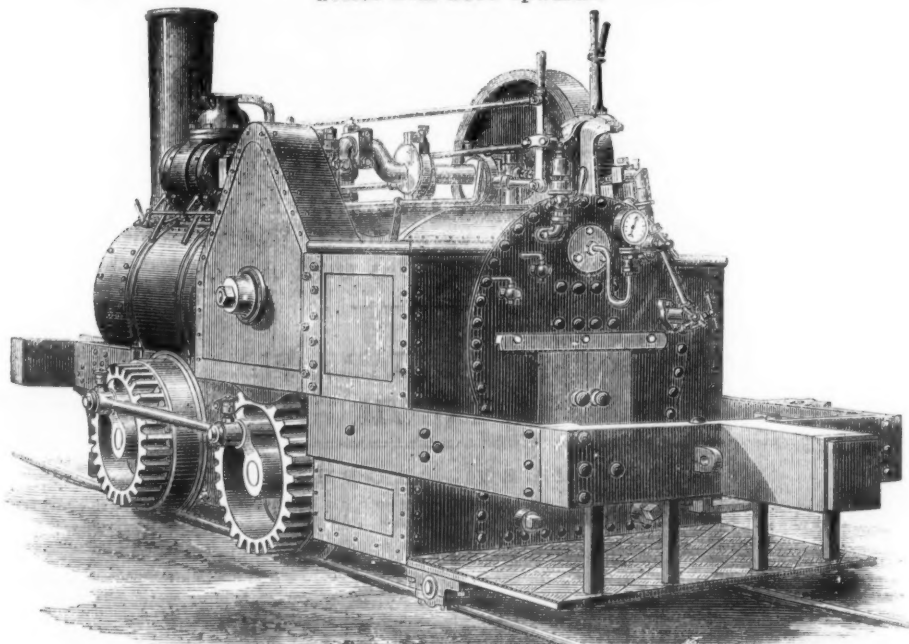
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"5. Its having an automatic feed, giving it a steady motion, &c.

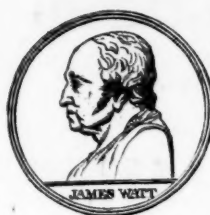
"6. Its greater steadiness and absence of jar and vibration experienced in other drills, which is very destructive to their working parts, &c.

"7. Its greater power is some FORTY PER CENT. in favour of the Ingersoll."

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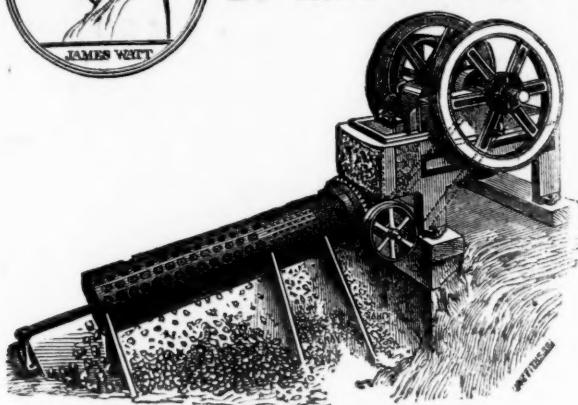
BUYERS are CAUTIONED against Purchasing any Infringements of H.R.M.'s Numerous PATENTS.



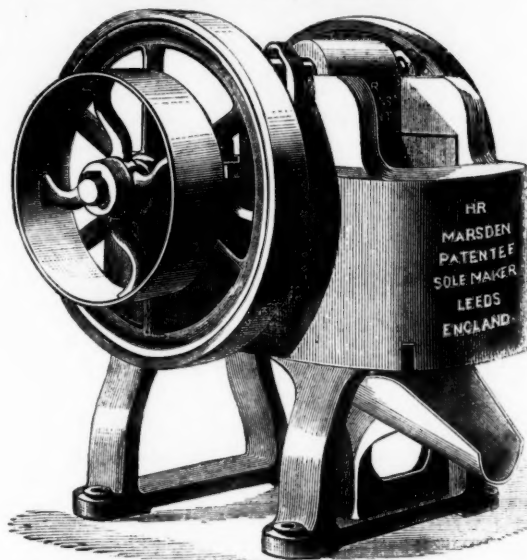
Ore Crushers, H.R.M.'s
New Patent Crushing Jaw
EXTENSIVELY USED
BY MINE OWNERS.

H.R. MARSDEN, LEEDS, Mining Improvements
ENGINEER. Revolving Picking
Table.

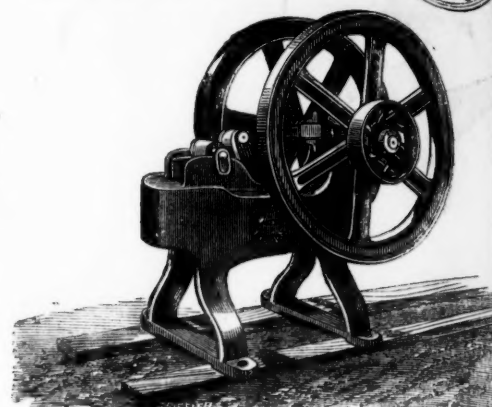
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FIXED MACHINE AND SCREEN,
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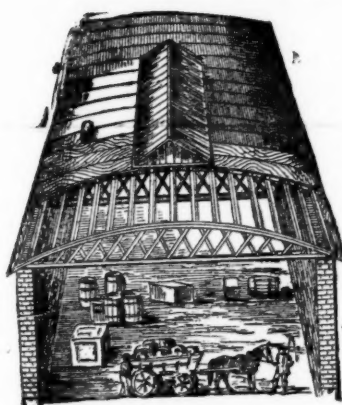
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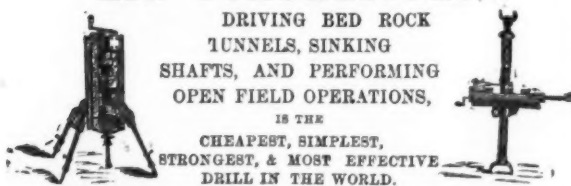
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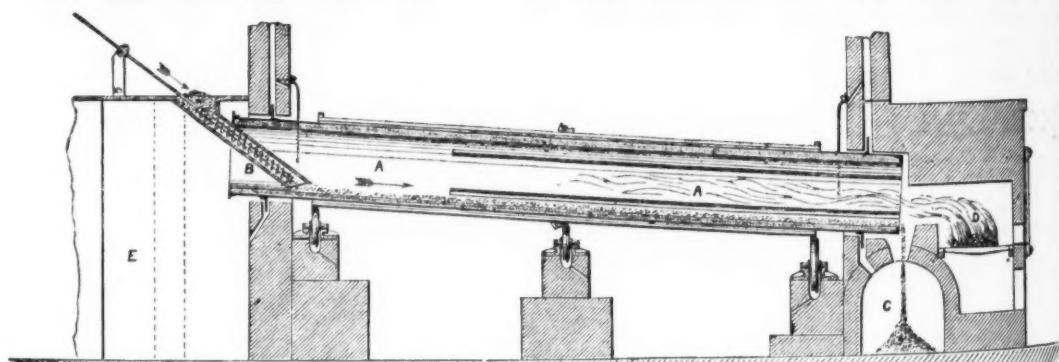
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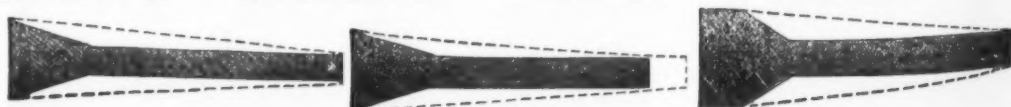
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